

AN AUTOMATIC PERSONALITY RECOGNITION SYSTEM USING TIME DISTRIBUTED CNN

NISHANTH N & KAMAL KHUMAR L S

Department of Computer Science and Engineering, St. Joseph's College of Engineering, Chennai, India

ABSTRACT

With the occasion of Artificial Intelligence (AI), the automated assessment of digital interviews to well-known individual personality traits has ended up being a lively place of research and has programs in character computing. Advances in computer vision have caused the foundation of convolutional neural organization models that accurately comprehend their character improvements. In this way, a start to finish Machine Learning (ML) fueled meeting machine was progressed with the utilization of Asynchronous Video Interview (AVI) handling. A TensorFlow AI engine seeming automated personality recognition (APR) upheld by the capacities separated from the AVIs. The exploratory results show that our ML-based meeting specialist effectively recognizes an interviewee's "OCEAN" advancement. Along these lines, the ML-based automated talk with the specialist can enhance or supplant current self-expressed character stock methods that cycle applicants may misshape to acknowledge socially suitable impacts.

KEYWORDS: Ocean, Convolutional Neural Network (CNN), Tensor Flow & Computer Vision

Received: Nov 01, 2021; **Accepted:** Nov 30, 2021; **Published:** Dec 09, 2021; **Paper Id:** IJCSEITRJUN20221

I. INTRODUCTION

Relational correspondence capabilities and personality qualities square measure is alluded to as indispensable accomplishment components for handling in general execution and construction adequacy [1]. Verbal messages square measure will not convey genuine words, and nonverbal messages, similar to motions, looks, stance, and manner of speaking, rectangular degree advantageous for information fundamental feelings, mentalities, and sentiments [2]. In any case, it's presently at this point not reasonable for each interaction an individual to sit tight for a live-work talk with nose to nose [3]. For this, we can utilize a nonconcurrent video talk with (AVI) programming pack to consequently talk with work candidates for one reason on schedule. This strategy allows managers to consider the sound apparent realities at a later reason in time [4]. When abuse by AVI, human raters know it is intellectually hard to well check candidates' demeanor improvements, upheld video pictures [5]. Perceiving the client's enthusiastic states is then one of the principal prerequisites for PC frameworks to accomplish act with people. Further, their square measure totally a portion of the endeavors to join data from outline movement and motions. All things considered, Sebe et al. [6] and Pantic et al. [7] spotlight that the best gadget for mechanized assessment and notoriety of human affectional data must be multimodal because of the reality the human tangible gadget is. Additionally, concentrates from mental science show the need to think about the thought of the blend of different non-verbal conduct modalities in human-human correspondence [8]. Altogether numerous works have researched the opportunity to combine apparent and methodology affectional assessment [9]. Some of them contemplated non-practical circumstances with individuals having dabs on their countenances to fortify the quest for the facial moves and none of them, to our data, taking beneath consideration low or variable amazing recordings

[10]. Additionally, we for the most part tend to weren't equipped for understanding the constructions running within side the term from the others [11].

In our circumstance, an individual should sit down in advance of his/her PC and highlight his/her contribution from the video with sound recovered from a customary computerized camera. The video quality is accordingly copious nonetheless the one presently utilized for assessment, in addition, because of the sound. Additionally, but, individual-based advancement of the preparation set is accessible in the commercial center we'd like the gadget to decide with somebody sitting in advance of the PC requires, accordingly, the person in reliance [13]. Throughout this peaceful circumstance, we, for the most part, will in general even experience to anticipate difficulties with the information signals, for instance, in a different case, an assortment of individuals square measure talking immediately or no close to lightweight is available to illuminate the clients face. During the leftover decade, most extreme works throughout this space utilize positively one of two modalities, both discourse or picture. From one perspective, discourse choices like pitch, power and straight forecast, and cepstral coefficients had been utilized [12]. Unexpectedly hand, the level of looks has a precious stone rectifier to the most extreme assessment line abuse apparent data. Here, the options separated by and large comprised of comprehensive portrayals (discrete Fourier coefficients, PCA projections of the face), consistent amount stream models, and facial tourist spots [13]. A ton as of late, explicit modalities like edge motions, bio-signals, et al. square measure started to be utilized [14].

During this work, we by and large will in general present a multimodal framework that approaches sound noticeable information, abusing the discourse information in the discourse and subsequently the advancement of the looks through time in recordings. The class of the sensation contained inside the video is delivered in one in every one of the five attributes through profound auto encoder networks. This design has been at present conscious and incorporates numerous layers designed up to hold onto high-request connections among the choices progressively.

The remainder of this paper is based as follows: In Section 2, we talk about the historical backdrop of APR from sound noticeable records. Section 3 portrays our records handling approach. An unmistakable form and its outcomes are given in Section 4. At long last, we talk and close our discoveries and future work in Section 5.

II. BACKGROUND

A. Character Taxonomy

The Large five disposition attributes, additionally referred to because of the reality of Sea model, conceivably a set off scientific categorization, or gathering, for demeanor qualities, [15] developed from the Eighties ahead in mental trademark hypothesis. When multivariate investigation (an executed mathematical procedure) is done to personality study data, it shows etymology organizations: a couple of expressions used to clarify components of demeanor square measure commonly carried out to the indistinguishable individual. These organizations recommend five broad measurements applied in not uncommon spot language (OCEAN) to clarify the human disposition, personality, and mind [16][17]. The center components of the huge five square measure are marked and completed in various social settings; those components square degree transparency, scruples, extroversion, appropriateness, and aggravation (low enthusiastic security) [18].

- Openness: how much an individual is innovative and inventive.
- Conscientiousness: how much an individual is coordinated, intensive, and insightful.

- **Extraversion:** the degree to which an individual is loquacious, enthusiastic, and confident.
- **Agreeableness:** how much an individual is thoughtful, kind, and tender.
- **Neuroticism:** mirrors the strain, irritability, and uneasiness an individual may feel.

Underneath each proposed global factor, there are a couple of corresponded and additional extraordinary essential elements. Extraversion is regularly connected with attributes like gregariousness, decisiveness, energy chasing, warmth, action, and great feelings [19]. These propensities aren't high contrast notwithstanding rather situated on continuums [20]. Self-rankings will likewise be comfortable with are expecting whether or presently no longer work competitor can be brilliant, proper to the task prerequisites and thusly the shape custom in a zero-colleague setting, respect a prospective employee meeting [21].

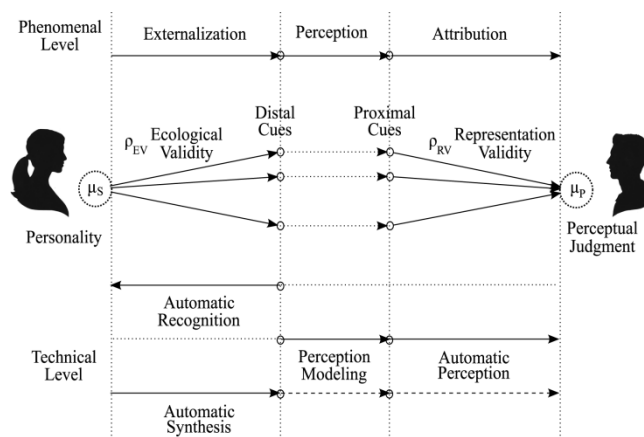


Figure 1: Process Flow of Temperament Computing.

B. Character Computing

The interviewees externalize their obvious disposition through distal signs (i.e., any noticeable practices which might be seen through the way of a method for the questioner, such as talking, body movement, and stance). This paper may even be a review of such advances and it targets giving not exclusively a strong information space in regards to the reformist however conjointly a theoretical model. By explicitly depicting what has been depleted before, reviews certainly characterize what will (and normally ought to) be cleared out inside the more extended term. The insightful assertion by Wright contributes essentially to the current last angle, especially once it includes adjusting disposition Figuring with the most recent advancements in personality Science. Besides, the article features the issues open inside the area and distinguishes potential application regions [23].

I/O logical discipline examines have discovered that somebody's dynamic looks, similar to facial strength, or a strained side mirrors their self-evaluated sea 5 qualities [24]-[26]. processing contemplates have discovered that CNNs are regularly wont to perceive a person's huge five characteristics upheld looks separated from video cuts; really, these figuring models have accomplished more prominent prescient force than human raters [27], [28]-[30]. Human raters/spectators may have predispositions (verifiable or express) that sway how interviewee prompts are deciphered, though a PC doesn't have understood inclinations: we will expect that a PC will assess all interviewees utilizing identical rules and make character decisions more steady and more attractive contrasted and those of human raters (see [22]).

III. DATA PREPARATION

A. Data Assortment

For the literary substance input, we keep an eye on the exploitation of the Flood of-mindfulness dataset that changed into aggregated at some stage in a gander at through method of the method for Pennebaker and Ruler [1999]. It incorporates an entire 2,468 consistently composing entries from thirty-4 mental innovation undergrads (29 women and 5 people whose quite a while went from eighteen to 67 with a middle of 26. 4). The composing entries had been a couple of the type of a bearing unrated task. for each task, undergrads had been expected to record somewhere around twenty mins in sync with the day on various specific points. the insights changed into assembled at some stage in a 2-week late spring season heading from 1993 to 1996. Understudies' demeanor evaluations had been surveyed through the method of a method for responsive the immense five Stock (BFI) [John et al., 1991]. The BFI can likewise be a 44-object self-document shape that gives a rating for everything about five demeanor characteristics. each article incorporates fast terms and is evaluated the utilization of a five-factor scale those levels from one (differ firmly) to five (concur unequivocally). AN illustration of a couple of the data convey incorporates AN ID, the genuine article, and five class marks of the huge five demeanor characteristics. Marks had been initially a couple of the types of both agreed ('y') or no ('n') to factor-scoring unreasonable or low for a given trait.

For sound data sets, we will be inclined to exploit the Ryerson General media information of Enthusiastic Discourse and Melody (RAVDESS). The information conveys twenty-4 expert entertainers (12 ladylike, 12 male), vocal tune 2 lexically coordinated with explanations in an extremely unprejudiced North yank highlight.

For the video data sets, we watch out for exploitation of the supported FER2013 Kaggle Challenge data set. The data incorporates 48x48 photograph detail grayscale photos of appearances. The countenances are mechanically enrolled so the admission is extra or substantially less designated and possesses the customary measure of area in each picture. the data set remaining parts difficult to apply for the explanation that there might be unfilled photographs or mistakenly marked photos.

B. Data Marking

To accumulate truth scores for the person's large 5 qualities [22], we utilized a 50-thing worldwide persona thing pool (IPIP) stock developed in [31] to remain the applicants self-appraised enormous 5 characteristics. Before partaking inside the AVI, all up-and-comers were needed to finish the IPIP review on the web and realize that the overview results may be added to the scientist's best which is likely unimportant of the recruiting proposal. This technique became performed to scale back the aftereffects of social longing, which could contort oneself evaluated persona improvements to understand the work opportunity [32].

C. Feature Extraction

To hold onto the up-and-comer's looks, we will in general beginning with the pre-prepared Origin v3 dataset gathered for Image Net, which incorporates very fourteen million pictures arranged into 1,000 classes. Furthermore, we will in general train our facial identification model upheld Open CV and Dlib through the following eighty-sixes facial milestone focuses per outline, as displayed in Figure 2. Additionally, we tend to utilize milestone reason 47 on the nasal root (see the picture of training data in Figure 2) because the anchor reason position all through include extraction to scale foundation and limit blunders like head movement. All things considered; this milestone intention is minimally influenced by looks [33].



Figure 2: Image Annotation.



Figure 3: Extracted Video Frames.

The element of the multitude of photos was standardized to 640 pixels, though the stature of each picture was dictated by the board greatness connection of the vision gadget. we will in general concentrate the choices of the 86 milestone focus from each edge inside five seconds from among all the AVI records for every candidate, as displayed in Figure 3. to support picture order and scale back foundation obstruction from hair and beautifiers, we will in general change every one of the photos over to grayscale. The check cases used during this test included every 10,000 pictures.

IV. MODELING AND RESULTS

We will probably grow a variant equipped to offer a live feeling assessment with a versatile interface. Subsequently, we've chosen to isolate two kinds of data sources:

- Literary info, comprising of answers for questions that may be mentioned by somebody from the stage.
- Video contribution from a live webcam, from that we will in general part the sound thus the photos.

A. Text Analysis

a) Pipeline: The content-based character acknowledgement pipeline has the resulting structure:

- Text data retrieving.
- Custom natural pre-processing:
 - Record tokenization.
 - Cleaning and normalization of plans utilizing customary articulations.

- Cancellation of the accentuation.
- Lowercasing the tokens.
- Expulsion of predefined stop words.
- Use of grammatical feature labels on the leftover tokens.
- Lemmatization of tokens utilizing grammatical feature labels for more exactness.
- Cushioning the groupings of badge of each record to compel the state of the info vectors.
- 300-measurement Word 2Vec teachable implanting.
- Forecast utilizing our pre-prepared model.

b) Model

We have chosen a neural detail that upheld every one-dimensional convolutional neural organization and lasting neural organization. The one-dimensional convolution layer plays out an endeavor assortment of trademark extraction: it grants finding designs in issue content information. The Long-Momentary Memory cell is then acclimated to influence the continuous idea of normal language: at present not kind of a step-by-step neural organization anyplace inputs sq. Measure thought to be independent of every other option, those models increasingly gather and hold onto records using the successions. LSTMs have the resources of memory styles now and then. Our last form first comprises three continuous squares just as the following four layers: one-dimensional convolution layer - max-pooling - spatial dropout - bunch normalization. The quantities of convolution channels region unit severally 128, 256, and 512 for each square, piece length is eight, max-pooling length could a few, so the dropout rate is zero. Following this, we chose to stack three LSTM cells with 100 and eighty yields each. At last, an associated layer of 128 hubs is each option sooner than the last order layer.

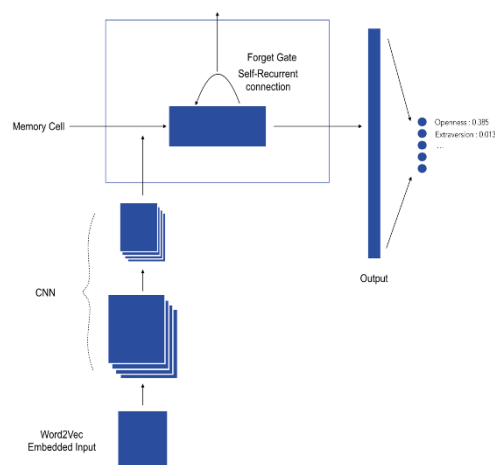


Figure 4: Text Architecture.

B. Audio Analysis

a) *Pipeline*: The discourse feeling acknowledgement pipeline was assembled the resulting way:

- Voice recording.

- Sound sign discretization.
- Log-mel-spectrogram extraction.
- Split spectrogram utilizing a moving window.

1) Make a Forecast Utilizing the Pre-Prepared Model

a) Model

The model we've picked might be a Time Distributed Convolutional Neural Network.

The fundamental arrangement of a Time Distributed Convolutional Neural Network is to utilize a moving window (consistent length and time-step) all on board the log-mel-spectrogram. Each one among those windows will be the entrance of a convolutional neural organization, made out of four Local Feature Learning Block (LFLBs) then, at that point the yield of every one among those convolutional networks place unit going to be taken care of into a lasting neural organization made out of 2 cells LSTM (Long short-run Memory) to chase out the drawn-out talk. At long last, an associated layer with SoftMax enactment is utilized to expect the inclination identified inside the voice.

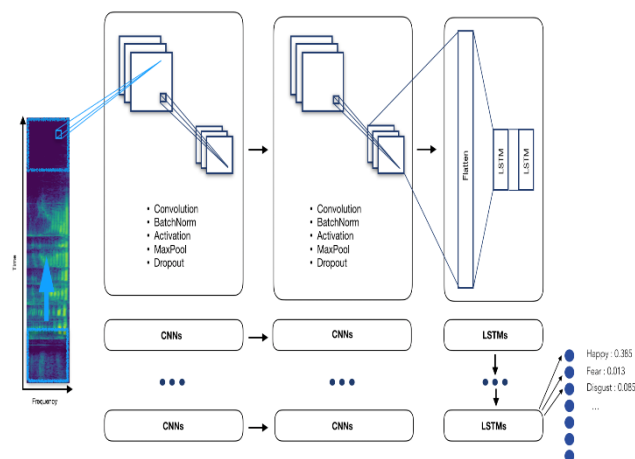


Figure 5: Audio Architecture.

B) Video Analysis

a) Pipeline

The video preparing pipeline was assembled the resulting way:

- Launch the webcam.
- Distinguish the face by Histogram of Situated Slopes.
- Zoom on the face.
- Measurement of the face to $48 * 48$ pixels.
- Foresee the face utilizing our pre-prepared model.
- Additionally, become mindful of the wide assortment of flickers at the facial tourist spots on each image.

b). Model

The model we've picked is an Xception model since it outflanked the contrary methodologies we grew so far. We tuned the model with:

- Data augmentation.
- Early halting.
- Diminishing the learning rate on a level.
- L2-Regularization.
- Class weight balancing.
- And kept the best model.

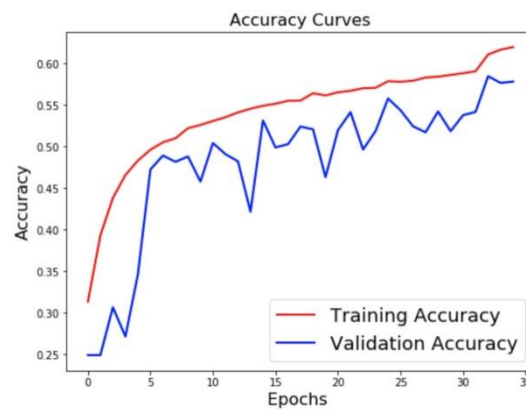


Figure 6: Accuracy on the Train and Test Dataset.

The Xception design is predicated on DepthWise Divisible convolutions that permit preparing many fewer boundaries, and along these lines decrease preparing time on Colab's GPUs to yet an hour and a half.

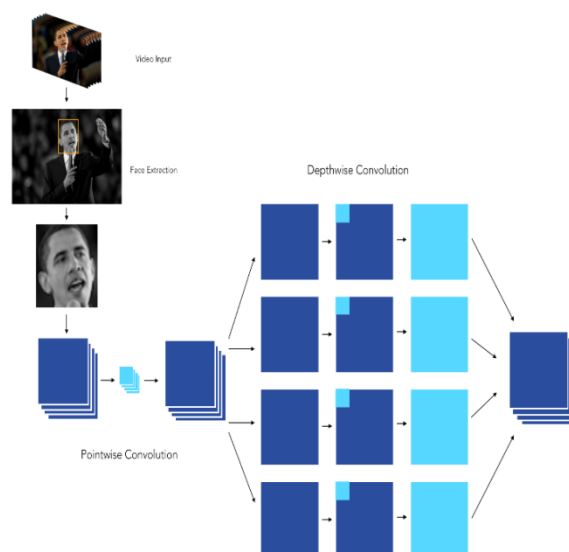


Figure 7: Video Architecture.

At the point when it involves utilizing CNNs in genuine presence applications, having the ability to clarify the impacts can be an exceptional test. we can positively plot tastefulness initiation maps, which show the pixels which may be enacted through the last convolution layer. We see how the pixels are being initiated in any case depending on the feeling being named. Fulfilment appears to rely upon the pixels related to the eyes and mouth, while disappointment or shock appears, as an illustration, to be more critical related to the eyebrows.

As you would perhaps have perceived, the point was to restrict over fitting the greatest sum conceivable to get a solid model.

C. Results

Before surveying our APRs execution, we tend to utilize IBM's applied math bundle for the sociologies to see the development legitimacy and inside consistency obligation for oneself detailed disposition qualities. Execution begins by preparing the content, sound, and video datasets for text, sound, and video investigation separately. 75% of the dataset is utilized for training the handcrafted configuration models thus the excess 25% of the dataset is utilized for testing purposes.

The information video is changed over into outlines and in each casing, the ideal alternatives are separated. the further developed time-disseminated CNN-related Xception model is giving a programmed and conservative arrangement of learned alternatives that work with North American nations to distinguish the inclination score. upheld the acquired score, the client's characteristic is known and his/her summed up report is shaped for comprehension agreeable. Along these lines, the arranged design furnishes just execution as contrasted and elective alternatives or models.

Table 1: Experimental Results

Features	Accuracy
SVM on HOG Features	32.8%
SVM on Facial Landmarks features	46.4%
SVM on Facial Landmarks and HOG features	47.5%
SVM on Sliding window Landmarks & HOG	24.6%
Simple Deep Learning Architecture	62.7%
Inception Architecture	59.5%
Xception Architecture	64.5%
Hybrid (HOG, Landmarks, Image)	45.8%

As shown in Table 1, the large five characteristics were learned and anticipated effectively by the AI TensorFlow motor. All fact large five-character self-appraisal scores may be anticipated by APR. Moreover; the characterization precision results show that the ordinary exactness of the classifiers (ACC) was 82.36%

V. CONCLUSIONS AND FUTURE DIRECTIONS

This examination might be a reaction to the choice for an investigation into character registering [29][33][34].

In this paper, we proposed an exceptional general media-based determination for feeling acknowledgement to exploit the information from both sound and visual channels. Our strategy utilized 2D-CNN and Xception for extricating sound and video includes separately. To additional catch the worldly data inside the content info, we utilized LSTM engineering after NLTK pre-preparing.

Past related examinations have found that multimodal features (picture housings and sound) learned by significant neural associations can pass on better displays in anticipating the colossal five attributes than can unimodal features. In future work, we might combine our visual system with prosodic features to find the best way to deal with seeing an interviewee's person. Additionally, this assessment utilized a picked sort of master as individuals, which can limit the generalizability of those preliminary outcomes. Future investigation should fuse more various part people.

REFERENCES

1. Hung-Yue Suen, Kuo-En Hung & Chien-Liang Lin, "Intelligent video interview agent used to predict communication skill and perceived personality traits", 2020.
2. Mohammadi G, Vinciarelli A (2012) "Towards a technology of nonverbal communication: vocal behavior in social and affective phenomena". In: Gokcay D, Yildirim G (eds) *Affective computing and interaction: psychological, cognitive and neuroscientific perspectives*. IGI, Pennsylvania, pp 133-156
3. I. Nikolaou and K. Foti, "Personnel selection and personality", in *The SAGE Handbook of Personality and Individual Differences*, V. Zeigler-Hill and T. K. Shackelford, Eds., London, U.K.: Sage, 2018, pp. 659-677.
4. F. S. Brenner, T. M. Ortner, and D. Fay, "Asynchronous video interviewing as a new technology in personnel selection: The applicant's point of view", *Frontiers Psychol.*, vol. 7, p. 863, Jun. 2016.
5. A. Vinciarelli and G. Mohammadi, "A survey of personality computing", *IEEE Trans. Affect. Comput.*, vol. 5, no. 3, pp. 273-291, Jul. 2014.
6. Sebe, N., Cohen, I., Huang, T.S.: "Multimodal Emotion Recognition, *Handbook of Pattern Recognition and Computer Vision*", World Scientific, ISBN 981-256-105-6, January 2005.
7. Pantic, M., Sebe, N., Cohn, J., Huang, T.S.: "Affective Multimodal Human-Computer Interaction", *ACM Multimedia*, pp. 669 - 676, Singapore, November 2005.
8. Scherer, K. R., Wallbott, H. G.: *Analysis of Nonverbal Behavior. HANDBOOK OF DISCOURSE: ANALYSIS*, Vol. 2, Cap. 11, Academic Press London, 1985.
9. Zeng, Z., Hu, Y., Liu, M., Fu, Y., Huang, T.S.: "Training combination strategy of multi-stream fused hidden Markov model for audio-visual affect recognition". In: *ACM MM*, pp. 65-68, 2006.
10. Busso, C., Deng, Z., Yildirim, S., Bulut, M., Lee, C., Kazemzadeh, A., Lee, S., Neumann, U., Narayanan, S.: "Analysis of emotion recognition using facial expressions, speech, and multimodal information". In: *Proceedings of ICMI*, pp. 205-211, 2004.
11. Audio-Visual Affect Recognition through Multi-Stream Fused HMM for HCI. In: *CVPR*. vol. 2, 2005.
12. Galmar, E., Huet, B.: "Analysis of Vector Space Model and Spatiotemporal Segmentation for Video Indexing and Retrieval". In: *ACM CIVR*, 2007.
13. Benmokhtar, R., Huet, B.: "Multi-level Fusion for Semantic Video Content Indexing and Retrieval". In: *Proceedings of AMR*, 2007.

14. IntelCorporation: *Open Source Computer Vision Library: Reference Manual*, November 2006.
15. Rothmann S, Coetzer EP. "The big five personality dimensions and job performance". *SA Journal of Industrial Psychology*. 29. doi:10.4102/sajip.v29i1.88, October 2003.
16. Goldberg LR. "The structure of phenotypic personality traits". *American Psychologist*. 48 (1): 26–34. doi:10.1037/0003-066x.48.1.26. PMID 8427480, January 1993.
17. Costa PT, McCrae RR. *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) manual*. Odessa, Florida: Psychological Assessment Resources, 1992.
18. D. P. Schmitt, J. Allik, R. R. McCrae, and V. Benet-Martínez, "The geographic distribution of Big Five personality traits: Patterns and profiles of human self-description across 56 nations", *J. Cross-Cultural Psychol.*, vol. 38, no. 2, pp. 173-212, Mar. 2007.
19. Matthews G, Deary IJ, Whiteman MC. "Personality Traits (2nd ed.)". Cambridge University Press. ISBN 978-0-521-83107-9, 2003.
20. De Bolle M, Beyers W, De Clercq B, De Fruyt F (November 2012). "General personality and psychopathology in referred and non-referred children and adolescents: an investigation of continuity, pathoplasty, and complication models". *Journal of Abnormal Psychology*. 121 (4): 958-70. doi:10.1037/a0027742. PMID 22448741.
21. M. Mikulincer, P. R. Shaver, M. L. Cooper, and R. J. Larsen, "APA Handbook of Personality and Social Psychology. Personality Processes and Individual Differences (APA Handbooks in Psychology)". Washington, DC, USA: APA, 2015.
22. Alessandro Vinciarelli, Gelareh Mohammadi, "A Survey of Personality Computing", *IEEE Page(s): 273 – 291*, June 2014.
23. L. P. Naumann, S. Vazire, P. J. Rentfrow, and S. D. Gosling, "Personality judgments based on physical appearance", *Personality Social Psychol. Bull.*, vol. 35, no. 12, pp. 1661-1671, Sep. 2009.
24. J. C. S. J. Junior et al. "First impressions: A survey on vision-based apparent personality trait analysis", 2018.
25. R. Petrican, A. Todorov, and C. Grady, "Personality at face value: Facial appearance predicts self and other personality judgments among strangers and spouses", *J. Nonverbal Behav.*, vol. 38, no. 2, pp. 259-277, Jan. 2014.
26. H. J. Escalante et al. "Explaining first impressions: Modeling, recognizing, and explaining apparent personality from videos", 2018.
27. A. Basu, A. Dasgupta, A. Thyagarajan, "A portable personality recognizer based on affective state classification using spectral fusion of features", *IEEE Trans. Affective Comput.*, vol. 9, no. 3, pp. 330-342, Jul./Sep. 2018.
28. S. Escalera, X. Baró, I. Guyon, and H. J. Escalante, "Guest editorial: Apparent personality analysis", *IEEE Trans. Affective Comput.*, vol. 9, no. 3, pp. 299-302, Jul./Sep. 2018.
29. G. Pons and D. Masip, "Supervised committee of convolutional neural networks in automated facial expression analysis", *IEEE Trans. Affective Comput.*, vol. 9, no. 3, pp. 343-350, Jul./Sep. 2018.
30. L. R. Goldberg, "The development of markers for the big-five factor structure", *Psychol. Assessment*, vol. 4, no. 1, pp. 26-42, Mar. 1992.
31. B. W. Swider, M. R. Barrick, and T. B. Harris, "Initial impressions: What they are, what they are not, and how they influence structured interview outcomes", *J. Appl. Psychol.*, vol. 101, no. 5, pp. 625-638, May 2016.
32. D. Xue et al., "Personality recognition on social media with label distribution learning", *IEEE Access*, vol. 5, pp. 13478-13488, 2017.

33. M. M. Tadesse, H. Lin, B. Xu, and L. Yang, "Personality predictions based on user behavior on the Facebook social media platform", *IEEE Access*, vol. 6, pp. 61959-61969, 2018.
34. Jha, Jasmine Taneja, and Snigdharani Mishra. "Employee Loyalty and Personality Traits–A Conceptual Study." *International Journal of Human Resource Management and Research (IJHRMR)* 9 (2019): 169-182.
35. Chandorkar, Nidhi. "Impact of Organisational Culture on Job Involvement: A Study of Higher Education Institutions in Mumbai." *International Journal of Human Resource Management and Research (IJHRMR)* 9 (2019): 161-168.
36. Al-Omari, A., and S. Alganbousi. "The entrepreneurial intentions among undergraduate students of Sultan Qaboos University and its relationship with their proactive personality." *International Journal of Educational Science and Research* 10.3 (2020): 37-48.
37. Arora, Harcharan Singh. "Purity and Pollution: The Dynamics of Social System in Ur Anantha Murthy's Samaskara." *International Journal of English and Literature (IJEL)* 8 (2018): 37-42